

**Characterizing non-resolved debris through spectral and photometric ground-based telescopic data:  
What can laboratory ground-truth data do for you?**

NASA's ODPO has recently collected data of unresolved objects at GEO with the 3.8m UKIRT infrared telescope on Mauna Kea and the 1.3m MCAT visible telescope on Ascension Island. Analyses of SWIR data of rocket bodies and HS-376 solar-panel covered buses demonstrate the uniqueness of spectral signatures. Data of 3 classes of rocket bodies show similarities amongst a given class, but distinct differences from one class to another, suggesting that infrared reflectance spectra could effectively be used toward characterizing and constraining potential parent bodies of uncorrelated targets (UCTs).

The Optical Measurements Center (OMC) at NASA JSC is designed to collect photometric signatures in the laboratory that can be used for comparison with telescopic data. NASA also has a spectral database of spacecraft materials for use with spectral unmixing models. Spectral unmixing of the HS-376 bus data demonstrates how absorption features and slopes can be used to constrain material characteristics of debris. Broadband photometry likewise can be compared with MCAT data of non-resolved debris images. Similar studies have been applied to IDCSP satellites to demonstrate how color-color photometry can be compared with lab data to constrain bulk materials signatures of spacecraft and debris.